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Abstract

THEORETICAL MODEL OF TURBULENT DIFFUSIVITY IN THREE - DIMENSIONAL LIQUID FLOW

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Three-dimensional model of turbulent diffusivity is formulated; this model permits to approximate all nine components of tensor of turbulent stress and three components of turbulent heat flow involved in original equations of dynamics for the turbulent flows.

The use of the developed model of turbulent diffusivity permits to formulate mathematically and solve different hydrodunamic and heat transfer problems for liquid flows in ducts of arbitrary form.

The developed theoretical model of turbulent diffusivity has been tested on calculated velocity and temperature fields in liquid flows in round tube.

Obtained values of velocity and temperature fields, resistance and number Nu factors give a good agreement with the available experimental results.

Further the results of velocity and temperature fields calculation are given for turbulent flow of liquid in channels of other modes - in annulus, flat and square channels and rod lattices.

Calculation results of velocity and temperature fields

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for above mentioned channels are compared with the available experimental results.

Sufficient agreement of these results with the experimental data gives ground to believe that the above mentioned theoretical model permits to determine the temperature fields in the fuel elements with its arbitrary construction with sufficient confidence.

In conclusion the possibilities of certain further generalization of theory and calculation procedures for hydrodynamic and heat conditions in reactor cell are given.